PATENT ABSTRACTS OF JAPAN

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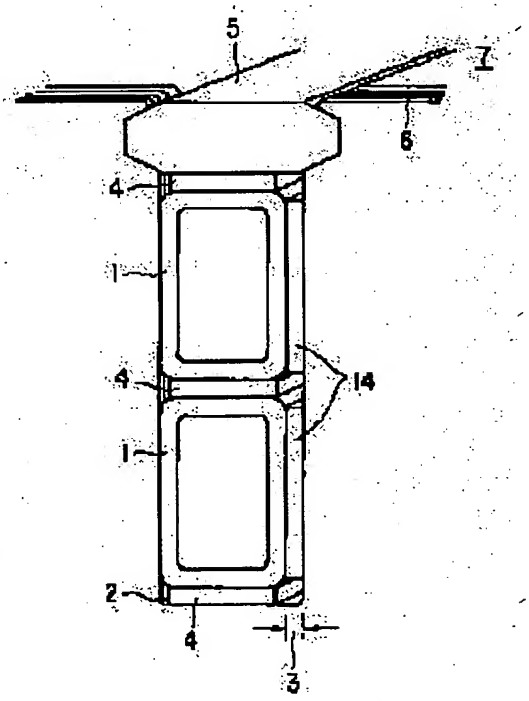
(54) ROTATING ELECTRIC MACHINE

(57)Abstract:

PROBLEM TO BE SOLVED: To restrain the temperature of an insulation coil from rising by improving thermal conductivity with the fixing force of the insulation coil maintained.

SOLUTION: An insulation coil 1 consisting of an insulating material and a conductor is installed in the slot 2 of a core 7. A composite elastic body 14 formed by mixing one of inorganic substance or metal whose thermal conductivity is more excellent than organic substance with a sheet-shaped or tape- shaped elastic body, is placed between the insulation coil 1 and the slot 2 of the core 7.



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CLAIMS

[Claim(s)]
[Claim 1] The dynamo-electric machine characterized by filling up the elastic body of the shape of the shape of a sheet, and a tape with the inorganic substance which was excellent in thermal conductivity as compared with the organic substance, and the metaled compound elastic body which comes to blend either at least between said insulating coils and slots of an iron core in the dynamo-electric machine constituted by containing the insulating coil which consists of an insulating material and a conductor in the slot of an iron core.
[Claim 2] The dynamo-electric machine characterized by to be filled up with the inorganic substance which was excellent in thermal conductivity at the elastic body of the shape of the shape of a sheet, and a tape as compared with the organic substance, and the metaled compound elastic body which arranges the shaft orientations with the field perpendicular direction of said elastic body, and comes to blend one of staple fibers or whiskers at least between said insulating coils and slots of an iron core in the dynamo-electric machine constituted by containing the insulating coil which consists of an insulating material and a conductor in the slot of an iron core.
[Claim 3] In the dynamo-electric machine constituted by containing the insulating coil which consists of an insulating material and a conductor in the slot of an iron core The inorganic substance which was excellent in the elastic body of the shape of the shape of a sheet and a tape at thermal conductivity as compared with the organic substance, and a metal at least one of staple fibers or whiskers The dynamo-electric machine characterized by being filled up with the compound elastic body which arranges the shaft orientations in the direction except the field perpendicular direction of said elastic body, and comes to blend them between said insulating coils and slots of an iron core.
[Claim 4] The dynamo-electric machine characterized by forming in the slot front face of said iron core the coating layer of the inorganic substance which was excellent in thermal conductivity at the elastic body as compared with the organic substance, and the metaled compound elastic body which comes to blend either at least in the dynamo-electric machine constituted by containing the insulating coil which consists of an insulating material and a conductor in the slot of an iron core.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] It relates the fixed force of an insulating coil to the dynamo-electric machine which enabled it to maintain and improve while this invention relates to the dynamo-electric machine constituted by containing the insulating coil which consists of an insulating material and a conductor in the slot of an iron core, especially raises thermal conductivity and controls the temperature rise of an insulating coil.
[0002]
[Description of the Prior Art] Generally, dynamo-electric machines, such as a motor and a generator, contain the insulating coil which consists of an insulating material and a conductor in the slot of an iron core, and are constituted. And electromagnetic force acts during operation and the insulating coil of this dynamo-electric machine mainly acts on a longitudinal direction including various kinds of force, such as heat flexible force, radially.
[0003] Therefore, these various force is borne, and after containing an insulating coil in the slot of an iron core, it is usually made to be the object which prevents deformation of an insulating coil, and to perform impregnation and hardening processing of resin with a motor or the generator of small capacity.

[0004] Since the impregnation after coil receipt of resin is difficult, he is trying to, contain the insulating coil which processed impregnation, hardening, etc. of resin beforehand in the slot of an iron core with a generator with big size on the other hand.
[0005] Drawing 7 is the partial cross-section perspective view showing an example of the stator of this kind of conventional dynamo-electric machine. In drawing 7 , the insulating coil 1 which processed impregnation, hardening, etc. of resin beforehand and which consists of an insulating material and a conductor is contained in the slot 2 of the iron core 7 which comes to carry out the laminating of two or more steel plates 6.
[0006] Moreover, it is fixing with the spacer 4 which consists the insulating coil 1 of FRP located in a graphic display up underside, and the wedge 5 which gives graphic display up down compressive force to these spacers 4.
[0007] Furthermore, there is deformation accompanying hardening of dispersion in a shaping dimension and impregnation resin in the insulating coil 1, and the dimension longitudinal direction of the slot 2 of an iron core 7 is not uniform, either. For this reason, generally allowances are given to slot 2 dimension to insulating coil 1 dimension. And as shown in drawing 7 , the FRP sheet 8 which is a restoration member is inserted in the gap 3 located in side-face one side of the insulating coil 1 produced as a result according to the magnitude of a gap 3, and the insulating coil 1 is fixed to it.
[0008] On the other hand, instead of the above-mentioned FRP sheet 8, as shown in drawing 8 , the FRP plate 9 which has a wave-like cross section may be inserted in a gap 3, and the insulating coil 1 may be fixed according to the recuperability of the FRP plate 9, and its frictional force.
[0009] As shown in drawing 9 , beforehand as other examples moreover, on the side face of the

insulating coil 1 Form the restoration member 12 which consists of an elastic body layer 10 filled up with the inorganic substance, and an elastic body layer 11 with which it is not filled up, and the insulating coil 1 is inserted into a slot 2 after that. The insulating coil 1 may be fixed according to the repulsive force of the restoration member 12 which consists of two elastic body layers 10 and 11, and frictional force with an iron core 7 (reference name-ROCEEDINGSOFTHE15THEIC and p35 -401).
[0010] Furthermore, as shown in drawing 10 , the sheet 13 of the elastic body which is the same approach as the above, and fabricated one side in the shape of a wave may be stuck on the insulating coil 1, the elastic modulus on appearance may be reduced, and insertion may be made easy.
[0011] namely, thermal resistance with the high gap 3 which intervenes between the insulating coil 1 and a slot 2 -- having -- under operation -- a conductor -- since the Joule's heat generated inside is made hard to tell an iron core 7 side, the temperature rise of the insulating coil 1 will be brought about and electric and reducing [of the organic substance which constitutes an insulation] a gap 3 as mentioned above, in order to promote degradation of a mechanical property will lead to improvement in the engine performance of a dynamo-electric machine.
[0012] However, when an approach like drawing 7 is used, the rigidity of the FRP sheet 8 is high and the irregularity of slot 2 inner surface of the iron core 7 produced by consisting of thin steel plates 6 which carried out the laminating cannot be followed. For this reason, a minute opening is generated and heat conduction to an iron core 7 may be checked.
[0013] Moreover, on a real activity, since it is impossible to prepare different thickness continuously, the FRP sheet 8 may be unable to be inserted, when the FRP sheet 8 which has the prepared thickness which was limited cannot adjust. For this reason, it is also it not only checking heat conduction, but producing an opening in the large range and reducing the fixed force of the insulating coil 1.
[0014] Although it can fully respond also to change of gap 3 dimension on the other hand when an approach like drawing 8 is used, by the wavelike cross section, an opening may remain between the insulating coil 1 and an iron core 7, and heat conduction may be checked.
[0015] Moreover, when an approach like drawing 9 is used, it has structure which follows the irregularity within a slot 2 and does not produce an opening using the elastic body layer 10 which blends an inorganic substance, and the elastic body layer 11 which is not blended, but since there is an elastic body layer 11 of only the organic substance in which thermal conductivity is inferior as compared with an inorganic substance metallurgy group, heat conduction may be checked in this elastic body layer 11.
[0016] Furthermore, since the sheet 13 of the elastic body which fabricated the front face in the shape of a wave is formed on the insulating coil 1 and this is inserted when an approach like drawing 10 is used, an opening is produced between the insulating coil 1 and an iron core 7, and heat conduction may be checked.
[0017]
[Problem(s) to be Solved by the Invention] As mentioned above, in the conventional dynamo-electric machine, there was a problem of bringing about the temperature rise of an insulating coil. The object of this invention is to offer the dynamo-electric machine which thermal conductivity is raised and can control the temperature rise of an insulating coil, maintaining the fixed force of an insulating coil.
[0018]
[Means for Solving the Problem] In order to attain the above-mentioned object, in the dynamo-electric machine constituted by containing the insulating coil which consists of an insulating material and a conductor in the slot of an iron core, the inorganic substance which was excellent in thermal conductivity as compared with the organic substance, and the metaled compound elastic body which comes to blend either at least are first filled up with invention corresponding to claim 1 into the elastic body of the shape of the shape of a sheet, and a tape between an insulating coil and the slot of an iron core.
[0019] Therefore, it sets to the dynamo-electric machine of invention corresponding to claim 1. The inorganic substance which was excellent in thermal conductivity as compared with the organic substance, and the metaled compound elastic body which blended either at least by being filled up between the insulating coil of a dynamo-electric machine, and the slot of an iron core Since it is hard to

produce the opening which thermal conductivity improves compared with an organic elastic body independent case, and a compound elastic body follows the irregularity of an iron core, and checks heat conduction, While being able to conduct efficiently the heat generated in the insulating coil to an iron core and being able to control the temperature rise of an insulating coil, an insulating coil is certainly fixable with the repulsive force of a compound elastic body.

[0020] Moreover, in invention corresponding to claim 2, the insulating coil which consists of an insulating material and a conductor is set to the dynamo-electric machine constituted by containing in the slot of an iron core. The inorganic substance which was excellent in the elastic body of the shape of the shape of a sheet and a tape at thermal conductivity as compared with the organic substance, and a metal at least one of staple fibers or whiskers It is filled up with the compound elastic body which arranges the shaft orientations with the field perpendicular direction of an elastic body, and comes to blend them between an insulating coil and the slot of an iron core.

[0021] Therefore, it sets to the dynamo-electric machine of invention corresponding to claim 2. An inorganic substance and the metaled compound elastic body which arranged the shaft orientations with the field perpendicular direction, and blended one of staple fibers or whiskers at least by being filled up between the insulating coil of a dynamo-electric machine, and the slot of an iron core Since the path which is easy to conduct the heat other than an operation of invention corresponding to above-mentioned claim 1 can be made into the shortest, Since it is hard to produce the opening which thermal conductivity improves further, and a compound elastic body follows an organic elastic body independent or this at the irregularity of an iron core compared with the case where a metal and an inorganic substance are blended in the non-direction, and checks heat conduction, While being able to conduct efficiently the heat generated in the insulating coil to an iron core and being able to control the temperature rise of an insulating coil, an insulating coil is certainly fixable with the repulsive force of a compound elastic body.

[0022] Furthermore, in invention corresponding to claim 3, the insulating coil which consists of an insulating material and a conductor is set to the dynamo-electric machine constituted by containing in the slot of an iron core. The inorganic substance which was excellent in the elastic body of the shape of the shape of a sheet and a tape at thermal conductivity as compared with the organic substance, and a metal at least one of staple fibers or whiskers It is filled up with the compound elastic body which arranges the shaft orientations in the direction except the field perpendicular direction of an elastic body, and comes to blend them between an insulating coil and the slot of an iron core.

[0023] Therefore, it sets to the dynamo-electric machine of invention corresponding to claim 3. At least the compound elastic body which arranged the shaft orientations in the direction except a field perpendicular direction of an inorganic substance and a metal, and blended one of staple fibers or whiskers by being filled up between the insulating coil of a dynamo-electric machine, and the slot of an iron core Since the path which is easy to conduct the heat other than an operation of invention corresponding to above-mentioned claim 1 can be shortened compared with the non-direction restoration of mere particle restoration or a staple fiber, Since it is hard to produce the opening which thermal conductivity improves further, and a compound elastic body follows the irregularity of an iron core, and checks heat conduction, while being able to reduce effects of rigid, such as a staple fiber, compared with the case where it blends perpendicularly An insulating coil is certainly fixable with the repulsive force of a compound elastic body.

[0024] By invention corresponding to claim 4, the coating layer of the inorganic substance which was excellent in the elastic body at thermal conductivity as compared with the organic substance, and the metaled compound elastic body which comes to blend either at least is formed in the slot front face of an iron core further again in the dynamo-electric machine constituted by containing the insulating coil which consists of an insulating material and a conductor in the slot of an iron core.

[0025] Therefore, it sets to the dynamo-electric machine of invention corresponding to claim 4. The coating layer of an inorganic substance and the metaled compound elastic body which comes to blend either at least by forming in the slot front face of an iron core Without depending for the flattery to the irregularity of an iron core on the flexibility of a compound elastic body compared with the case where

form a restoration member in an insulating coil and this is inserted into a slot like invention corresponding to above-mentioned claim 1 Since it can be filled up with the gap of the slot of an iron core, and an insulating coil without a crevice, while being able to conduct the heat generated in the insulating coil much more efficiently by the iron core and being able to control the temperature rise of an insulating coil, an insulating coil is certainly fixable with the repulsive force of a compound elastic body.

[0026]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained to a detail with reference to a drawing.

(Gestalt of the 1st operation) Drawing 1 is the partial cross-section perspective view showing the example of a configuration of the stator of the dynamo-electric machine by the gestalt of this operation, and attaches and shows the same sign to the same part as drawing 7 thru/or drawing 10 .

[0027] In drawing 1 , the insulating coil 1 which processed impregnation, hardening, etc. of resin beforehand and which consists of an insulating material and a conductor is contained in the slot 2 of the iron core 7 which comes to carry out the laminating of two or more steel plates 6.

[0028] Moreover, the insulating coil 1 which consists of an insulating material and a conductor is fixed with the spacer 4 which consists of FRP located in a graphic display up underside, and the wedge 5 which gives graphic display up down compressive force to these spacers 4.

[0029] Furthermore, it is filled up with the restoration member 14 between the insulating coil 1 and the slot 2 of an iron core 7 (part located in side-face one side of the insulating coil 1), and the insulating coil 1 is fixed to it also by this restoration member 14.

[0030] Here, the restoration members 14 are the inorganic substance which was excellent in the elastic body of the shape of the shape of a sheet, and a tape at thermal conductivity as compared with the organic substance, and a metaled compound elastic body which comes to blend either at least.

[0031] As a compound elastic body, in this case, moreover, to the elastic body of the shape of the shape of a (a) sheet, and a tape The inorganic substance which was excellent in thermal conductivity as compared with the organic substance, and a metal at least one of staple fibers or whiskers To the elastic body of the shape of the shape of a compound (elastic body b) sheet which arranges with the field perpendicular direction of an elastic body, and it comes to blend, and a tape, the shaft orientations It is desirable to use at least either of the compound elastic bodies which arrange the shaft orientations in the direction except the field perpendicular direction of an elastic body of the inorganic substance which was excellent in thermal conductivity as compared with the organic substance, and a metal, and come to blend one of staple fibers or whiskers.

[0032] With the gestalt of this operation, the compound elastic body which arranges the shaft orientations in the direction except the field perpendicular direction of an elastic body, and comes to blend the staple fiber of the metal which was excellent in thermal conductivity as compared with the organic substance is used for the elastic body of the shape of the shape of a sheet, and a tape.

[0033] Drawing 2 is the elements on larger scale which expanded the part in the dynamo-electric machine of drawing 1 . In drawing 2 , the restoration member 14 makes about 45 degrees incline, and consists of a staple fiber 15 of with a die length [the diameter of 20 micrometers and die length of 0.7mm] which were blended in the about 1 direction (direction except the field perpendicular direction of an elastic body) copper, and silicone rubber 16 which is a matrix (elastic body).

[0034] Here, the rate that the copper staple fiber 15 occupies in silicone rubber 16 is made into 15vo1%. Moreover, he is trying for the sum total of the width of face of the insulating coil 1 and the thickness of the restoration member 14 to become large about 15% to two slots.

[0035] When being actually filled up with this restoration member 14 between the insulating coil 1 of a dynamo-electric machine, and the slot 2 of an iron core 7, the restoration member 14 is stuck at side-face one side of the insulating coil 1 in the forward direction, i.e., the direction in which it deforms at the time of slot 2 insertion, and a staple fiber 15 inclines further, and is inserted into a slot 2.

[0036] Next, it sets to the dynamo-electric machine of the gestalt of this operation constituted as mentioned above. The restoration member 14 which is the compound elastic body which blended the

metal (copper) which was excellent in thermal conductivity as compared with the organic substance by being filled up between the insulating coil 1 of a dynamo-electric machine, and the slot 2 of an iron core 7 Since it is hard to produce the opening which thermal conductivity improves compared with the case organic elastic body independent [like before] mentioned above, and the restoration member 14 which is a compound elastic body follows the irregularity of an iron core 7, and checks heat conduction, The heat generated in the insulating coil 1 can be efficiently conducted to an iron core 7, and the temperature rise of the insulating coil 1 can be controlled.

[0037] In this case, the restoration member 14 which is the compound elastic body which arranged those shaft orientations in the direction except a field perpendicular direction, and blended the metaled (copper) staple fiber 15 with the gestalt of this operation Since the path which is easy to conduct heat by being filled up between the insulating coil 1 of a dynamo-electric machine and the slot 2 of an iron core 7 can be shortened compared with the non-direction restoration of mere particle restoration or a staple fiber, Thermal conductivity improves further, and since it is hard to produce the opening where the restoration member 14 which is a compound elastic body follows the irregularity of an iron core 7, and checks heat conduction, effects of rigid, such as a staple fiber, can be reduced compared with the case where it blends perpendicularly.

[0038] The thermal conductivity about the thickness direction of the restoration member 14 shown in this thermal property, therefore drawing 2 was measured by the stationary method. Consequently, 1.02w/m-k 0.23w/m-k which it becomes and is the average thermal conductivity of silicone rubber 16 It was able to check that it was the thermal conductivity of 4 times or more.

[0039] On the other hand, in the dynamo-electric machine of the gestalt of this operation, the insulating coil 1 is certainly fixable with the repulsive force of the restoration member 14 which is a compound elastic body. That is, he is trying for the sum total of the width of face of the insulating coil 1 and the thickness of the restoration member 14 to become large about 15% to a slot width. For this reason, repulsive force acts to the cross direction of a slot 2, and the fixed force by the frictional force of the silicone rubber 16 which made this vertical reaction, and the fixed force of slot 2 longitudinal direction generated according to the edge effect by the irregularity of the iron core 7 which consists of a steel plate 6 which carried out the laminating arise.

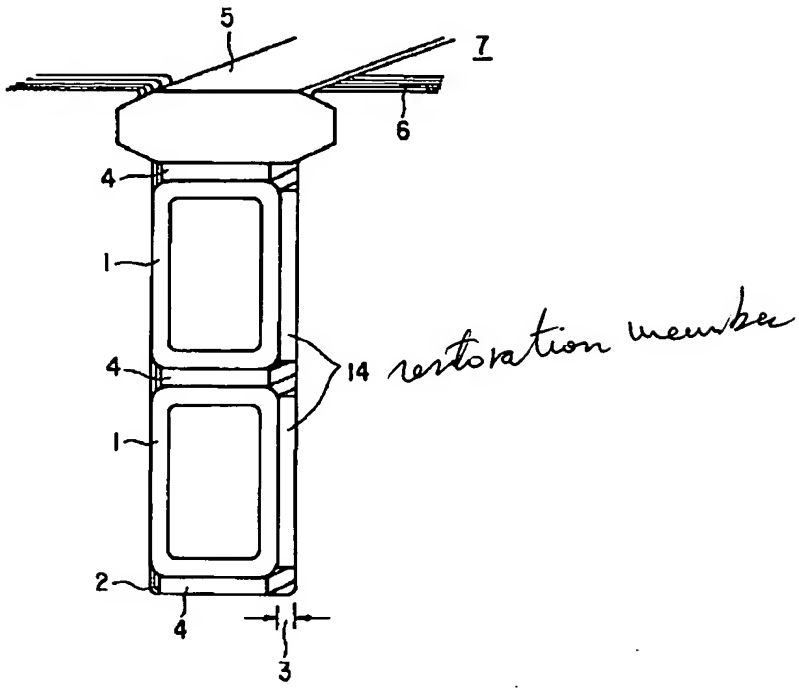
[0040] Furthermore, when the force acts in the direction in which the insulating coil 1 escapes from the dip direction of the copper staple fiber 15 by trying becoming the forward direction at the time of insertion, the dip of the copper staple fiber 15 decreases in number, the further repulsive force is produced to the thickness direction, and the fixed force increases.

[0041] The temperature rise of the insulating coil 1 can be reduced the above result by using the restoration member 14 which arranged and blended the shaft orientations of the staple fiber 15 of the metal (copper) excellent in thermal conductivity in the direction except a field perpendicular direction.

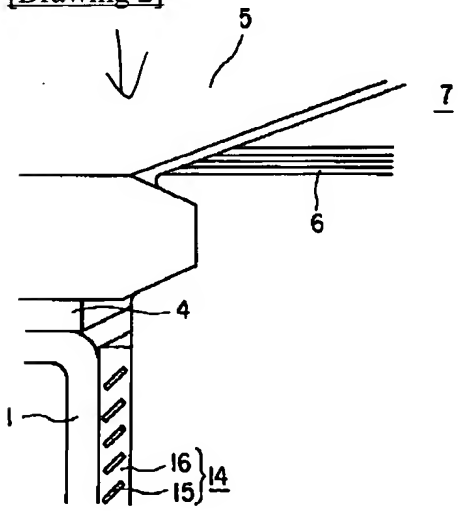
[0042] Moreover, the fixed force of the insulating coil 1 can be increased to the path of insertion of a slot 2 by making staple fiber 15 metaled (copper) shaft into the forward direction. As mentioned above, in the dynamo-electric machine by the gestalt of this operation, the elastic body (silicone rubber 16) of the shape of the shape of a sheet and a tape is filled up with the restoration member 14 which is the compound elastic body which arranges the shaft orientations in the direction except the field perpendicular direction of an elastic body, and comes to blend the staple fiber 15 of the metal (copper) which was excellent in thermal conductivity as compared with the organic substance between the insulating coil 1 and the slot 2 of an iron core 7.

[0043] Therefore, since it is hard to produce the opening which thermal conductivity improves compared with an organic elastic body independent case, and the restoration member 14 which is a compound elastic body follows the irregularity of an iron core 7, and checks heat conduction, the heat generated in the insulating coil 1 is efficiently conducted to an iron core 7, and it becomes possible to control the temperature rise of the insulating coil 1.

[0044] Since he is trying to be filled up with the compound elastic body which arranged those shaft orientations in the direction except a field perpendicular direction, and blended the metaled (copper) staple fiber 15 in this case especially Since the path which is easy to conduct heat can be shortened



[Drawing 2]



[Drawing 3]

compared with the non-direction restoration of mere particle restoration or a staple fiber, Thermal conductivity improves further, and since it is hard to produce the opening where the restoration member 14 which is a compound elastic body follows the irregularity of an iron core 7, and checks heat conduction, it becomes possible to reduce the effect of rigid of metaled (copper) staple fiber 15 grade compared with the case where it blends perpendicularly.

[0045] Moreover, the repulsive force of the restoration member 14 which is a compound elastic body enables it to certainly fix the insulating coil 1.

(Gestalt of the 2nd operation) Drawing 3 is the partial cross-section perspective view showing the example of a configuration of the stator of the dynamo-electric machine by the gestalt of this operation, and attaches and shows the same sign to the same part as drawing 1 .

[0046] In drawing 3 , the insulating coil 1 which processed impregnation, hardening, etc. of resin beforehand and which consists of an insulating material and a conductor is contained in the slot 2 of the iron core 7 which comes to carry out the laminating of two or more steel plates 6.

[0047] Moreover, the insulating coil 1 which consists of an insulating material and a conductor is fixed with the spacer 4 which consists of FRP located in a graphic display up underside, and the wedge 5 which gives graphic display up down compressive force to these spacers 4.

[0048] Furthermore, it is filled up with the restoration member 14 between the insulating coil 1 and the slot 2 of an iron core 7 (part located in side-face one side of the insulating coil 1), and the insulating coil 1 is fixed to it also by this restoration member 14.

[0049] Here, the restoration members 14 are the inorganic substance which was excellent in the elastic body at thermal conductivity as compared with the organic substance, and a metaled compound elastic body which comes to blend either at least. With the gestalt of this operation, the compound elastic body which comes to blend the staple fiber of the metal which was excellent in thermal conductivity as compared with the organic substance in the non-direction is used for an elastic body.

[0050] Drawing 4 is the partial cross-section perspective view showing the condition of having removed the insulating coil 1 in the dynamo-electric machine of drawing 1 , the spacer 4, and the wedge 5. In drawing 4 , the mixture of the staple fiber 15 of copper with a diameter [of 20 micrometers] blended in the non-direction at a 15vol% rate and a die length of 0.5mm and the room-temperature-curing mold liquefied silicone rubber (TSE-382, Toshiba Silicone make) 16 which is a matrix (elastic body) is applied so that it may become almost uniform thickness, and the restoration member 14 stiffens it.

[0051] He is trying, as for the spreading thickness of the restoration member 14, for the sum total of the width of face of the insulating coil 1 and the thickness of the restoration member 14 to serve as a value of two slots which increased about 15% here. The insulating coil 1 is inserted in the slot 2 which applied the restoration member 14 to slot 2 front face as it was shown in drawing 3 , when being actually filled up with this restoration member 14 between the insulating coil 1 of a dynamo-electric machine, and the slot 2 of an iron core 7 (coating).

[0052] Next, it sets to the dynamo-electric machine of the gestalt of this operation constituted as mentioned above. The restoration member 14 which is the coating layer of the compound elastic body which comes to blend a metal (copper) by forming in slot 2 front face of an iron core 7 Without depending for the flattery to the irregularity of an iron core 7 on the flexibility of the restoration member 14 which is the coating layer of a compound elastic body compared with the case where form the restoration member 14 in the insulating coil 1, and this is inserted into a slot 2 like the gestalt of said 1st operation Since it can be filled up with the gap 3 of the slot 2 of an iron core 7, and the insulating coil 1 without a crevice, the heat generated in the insulating coil 1 can be conducted much more efficiently by the iron core 7, and the temperature rise of the insulating coil 1 can be controlled.

[0053] On the other hand, in the dynamo-electric machine of the gestalt of this operation, the insulating coil 1 is certainly fixable with the repulsive force of the restoration member 14 which is a compound elastic body. That is, the sum total of the width of face of the insulating coil 1 and the thickness of the restoration member 14 is enlarged about 15% to two slots. For this reason, repulsive force acts to the cross direction of a slot 2, and the fixed force by the frictional force of the silicone rubber 16 which made this vertical reaction is produced.

[0054] It compares, when forming in the insulating coil 1 the restoration member 14 which is a compound elastic body like the gestalt of said 1st operation the above result and inserting into a slot 2. By forming in slot 2 front face the restoration member 14 which is the coating layer of the compound elastic body which blended the staple fiber 15 of the metal (copper) excellent in thermal conductivity, and inserting the insulating coil 1 Since the opening which the thermal conductivity of the restoration member 14 which is the coating layer of a compound elastic body improves, and is made between slot 2. front face and the restoration member 14 can be reduced, The generated Joule's heat besides immobilization of the insulating coil 1 can be more efficiently conducted to an iron core 7, and the temperature rise of the insulating coil 1 can be reduced.

[0055] As mentioned above, in the dynamo-electric machine by the gestalt of this operation, the restoration member 14 which is the coating layer of the compound elastic body which comes to blend with an elastic body (silicone rubber 16) the staple fiber 15 of the metal (copper) which was excellent in thermal conductivity as compared with the organic substance in the non-direction is formed in slot 2 front face of an iron core 7.

[0056] Therefore, the restoration member 14 is formed in the insulating coil 1 like the gestalt of said 1st operation. Without being dependent on the flexibility of the restoration member 14 which is the coating layer of a compound elastic body about the flattery to the irregularity of an iron core 7 compared with the case where this is inserted into a slot 2 Since it can be filled up with the gap 3 of the slot 2 of an iron core 7, and the insulating coil 1 without a crevice, the heat generated in the insulating coil 1 is conducted much more efficiently by the iron core 7, and it becomes possible to control the temperature rise of the insulating coil 1. Moreover, the repulsive force of the restoration member 14 which is the coating layer of a compound elastic body enables it to certainly fix the insulating coil 1.

[0057]

[Example] Like the gestalt of said 1st operation, the restoration member 14 was formed in the insulating coil 1, and in order to compare the thermal conductivity of both in the case where it inserts into a slot 2, and the case of forming the restoration member 14 beforehand in a slot 2 like the gestalt of said 2nd operation, and inserting into a slot 2, the sample as shown in drawing 5 and drawing 6 , respectively was produced.

[0058] two aluminum blocks (A1100) whose samples shown in drawing 5 performed 1mm width-of-face, 1mm depth, and pitch 1mm recessing to surface one side -- among 17, the restoration member 14 with a thickness of 5mm produced with the compounding ratio more nearly same than the staple fiber of liquefied silicone rubber (TSE-382 and Toshiba Silicone, Inc.) and the above-mentioned copper is put so that a processing side may be faced.

[0059] Moreover, the sample shown in drawing 6 performs recessing like the case of drawing 5 , it does not have a clearance so that minimum thickness may be set to 5mm, is filled up with the mixture 14 of the staple fiber of the same liquefied silicone rubber (TSE-382) as drawing 5 , and copper, and makes it harden between two aluminum blocks 17 arranged so that a processing side may meet.

[0060] About the sample shown in these drawing 5 and drawing 6 , when thermal conductivity was measured by the stationary method, the direction of the sample shown in drawing 6 became a value high 30% or more.

(Gestalt of other operations)

(a) Although the gestalt of implementation of the above 1st explained the case where arranged the shaft orientations in the direction except the field perpendicular direction of an elastic body, and the staple fiber of the metal which was excellent in thermal conductivity as compared with the organic substance was blended with the elastic body of the shape of the shape of a sheet, and a tape, the shaft orientations are arranged with the field perpendicular direction of an elastic body, and you may make it blend the staple fiber of the metal which was excellent in thermal conductivity not only as compared with this but the organic substance.

[0061] In this case, since the path which is easy to conduct heat by being filled up with the restoration member which is the compound elastic body which arranged those shaft orientations with the field perpendicular direction, and blended the metaled staple fiber between an insulating coil and the slot of

an iron core can be made into the shortest, Since it is hard to produce the opening which thermal conductivity improves further, and a compound elastic body follows an organic elastic body independent or this at the irregularity of an iron core compared with the case where a metal is blended in the non-direction, and checks heat conduction, While being able to conduct efficiently the heat generated in the insulating coil to an iron core and being able to control the temperature rise of an insulating coil, an insulating coil is certainly fixable with the repulsive force of a compound elastic body.

[0062] (b) Although the gestalt of each above-mentioned implementation explained the case where the metal which was excellent in thermal conductivity as compared with the organic substance was blended with an elastic body, you may make it blend not only with this but with an elastic body the inorganic substance which was excellent in thermal conductivity as compared with the organic substance.

[0063] (c) Although the gestalt of each above-mentioned implementation explained the case where the metal or inorganic substance which was excellent in thermal conductivity as compared with the organic substance was blended with an elastic body, you may make it blend not only with this but with an elastic body both the inorganic substance which was excellent in thermal conductivity as compared with the organic substance, and a metal.

[0064] (d) the metal which was excellent in the elastic body with the gestalt of each above-mentioned implementation at thermal conductivity as compared with the organic substance -- or -- and the metal which was excellent not only in this but the elastic body at thermal conductivity as compared with the organic substance although the case where the staple fiber of an inorganic substance was blended was explained -- or -- and you may make it blend the whisker of an inorganic substance

[0065] (e) Although the gestalt of each above-mentioned implementation explained the case where copper was used, as a metal blended with an elastic body, you may make it blend the metal of not only this but others with an elastic body.

[0066]

[Effect of the Invention] In the dynamo-electric machine constituted by containing the insulating coil which consists of an insulating material and a conductor in the slot of an iron core as explained above According to invention corresponding to claim 1, first, to the elastic body of the shape of the shape of a sheet, and a tape Since it was filled up with the inorganic substance which was excellent in thermal conductivity as compared with the organic substance, and the metaled compound elastic body which comes to blend either at least between the insulating coil and the slot of an iron core The dynamo-electric machine which thermal conductivity is raised and can control the temperature rise of an insulating coil can be offered maintaining the fixed force of an insulating coil.

[0067] According to invention corresponding to claim 2, moreover, to the elastic body of the shape of the shape of a sheet, and a tape The inorganic substance which was excellent in thermal conductivity as compared with the organic substance, and a metal at least one of staple fibers or whiskers Since it was filled up with the compound elastic body which arranges the shaft orientations with the field perpendicular direction of an elastic body, and comes to blend them between the insulating coil and the slot of an iron core The dynamo-electric machine which thermal conductivity is raised further and can control the temperature rise of an insulating coil can be offered maintaining the fixed force of an insulating coil.

[0068] According to invention corresponding to claim 3, furthermore, to the elastic body of the shape of the shape of a sheet, and a tape The inorganic substance which was excellent in thermal conductivity as compared with the organic substance, and a metal at least one of staple fibers or whiskers Since it was filled up with the compound elastic body which arranges the shaft orientations in the direction except the field perpendicular direction of an elastic body, and comes to blend them between the insulating coil and the slot of an iron core The dynamo-electric machine which thermal conductivity is raised further and can control the temperature rise of an insulating coil can be offered maintaining the fixed force of an insulating coil.

[0069] Since the coating layer of the inorganic substance which was excellent in thermal conductivity as compared with the organic substance, and the metaled compound elastic body which comes to blend

either at least was formed in the slot front face of an iron core, while according to invention corresponding to claim 4 being able to raise thermal conductivity further to an elastic body and being able to control the temperature rise of an insulating coil to it further again, the dynamo-electric machine which can be maintained and improved in the fixed force of an insulating coil can be offered.

[Translation done.]

* NOTICES *

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The partial cross-section perspective view showing the gestalt of operation of the 1st of the dynamo-electric machine by this invention.
[Drawing 2] The elements on larger scale in the dynamo-electric machine of the gestalt of this 1st operation.
[Drawing 3] The partial cross-section perspective view showing the gestalt of operation of the 2nd of the dynamo-electric machine by this invention.
[Drawing 4] said -- the partial cross-section perspective view showing the condition of having removed the insulating coil in the dynamo-electric machine of the 2nd operation gestalt, the spacer, and the wedge.
[Drawing 5] The perspective view showing the example of the sample for thermal conductimetry by the gestalt of this 1st operation.
[Drawing 6] The perspective view showing the example of the sample for thermal conductimetry by the gestalt of this 2nd operation.
[Drawing 7] The partial cross-section perspective view showing an example of the stator of the conventional dynamo-electric machine.
[Drawing 8] The partial cross-section perspective view showing other examples of the stator of the conventional dynamo-electric machine.
[Drawing 9] The partial cross-section perspective view showing other examples of the stator of the conventional dynamo-electric machine.
[Drawing 10] The partial cross-section perspective view showing other examples of the stator of the conventional dynamo-electric machine.
[Description of Notations]
1 -- Insulating coil,
2 -- Slot of an iron core,
3 -- Gap,
4 -- Spacer,
5 -- Wedge,
6 -- Steel plate,
7 -- Iron core,
8 -- Restoration member,
9 -- FRP plate,
10 -- Elastic body layer filled up with the inorganic substance,
11 -- Elastic body layer which is not filled up with an inorganic substance,
12 -- Restoration member,
13 -- Wavelike shaping elastic body,
14 -- Restoration member,
15 -- Staple fiber,

16 -- Silicone rubber,
17 -- Aluminum block.

[Translation done.]

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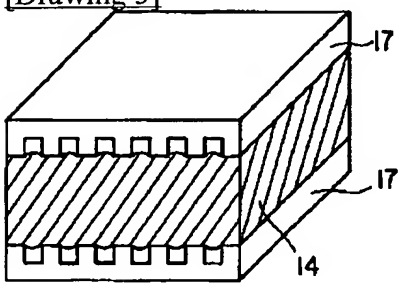
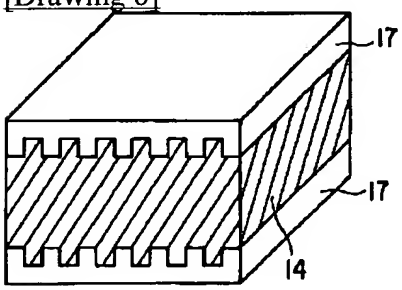
DRAWINGS

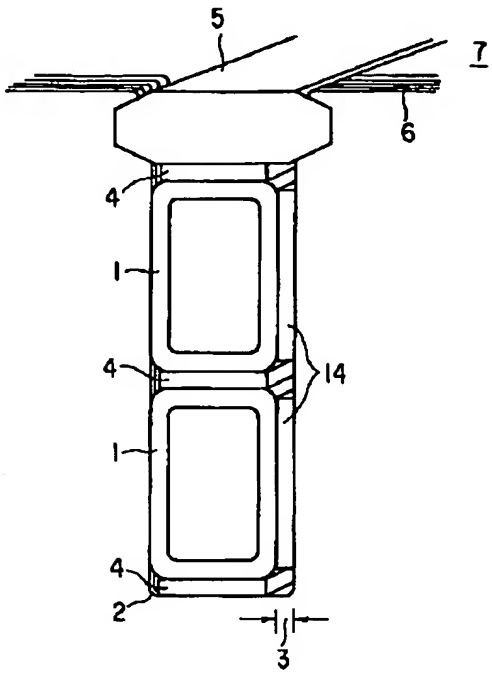
[Drawing 5]



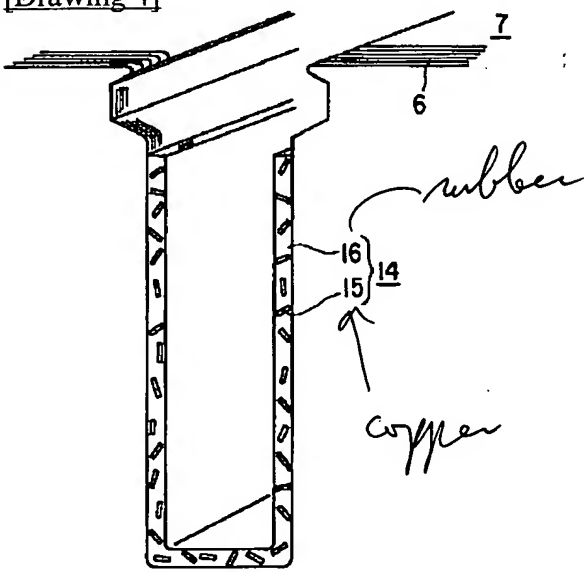
[Drawing 6]



[Drawing 1]

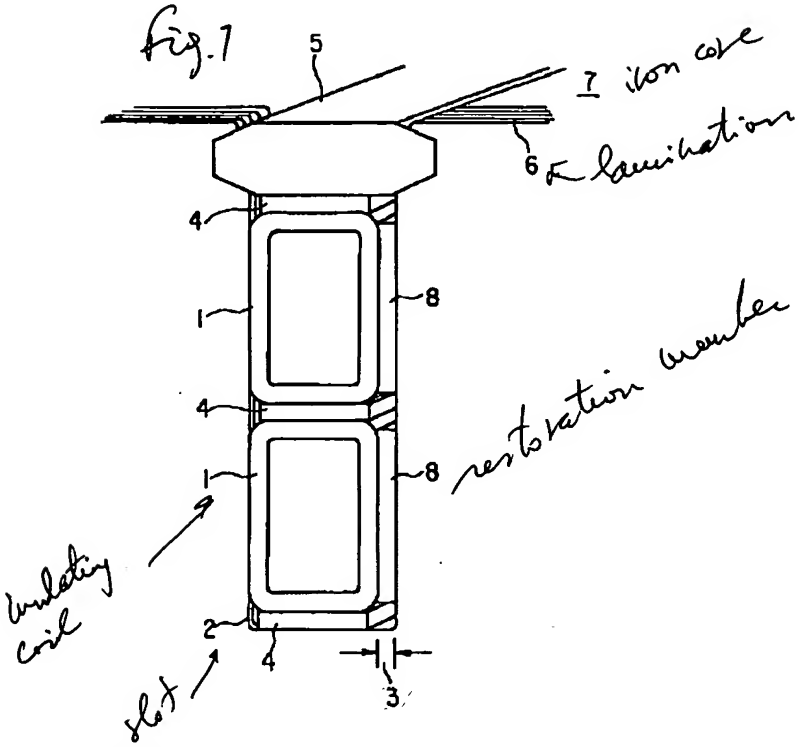


[Drawing 4]

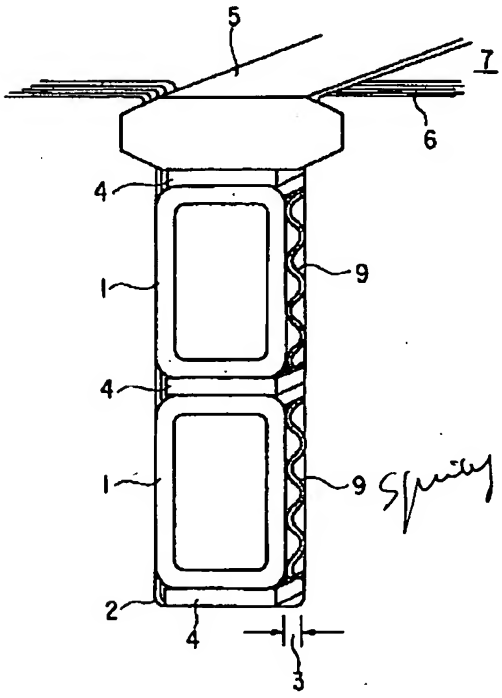


[Drawing 7]

Fig.1

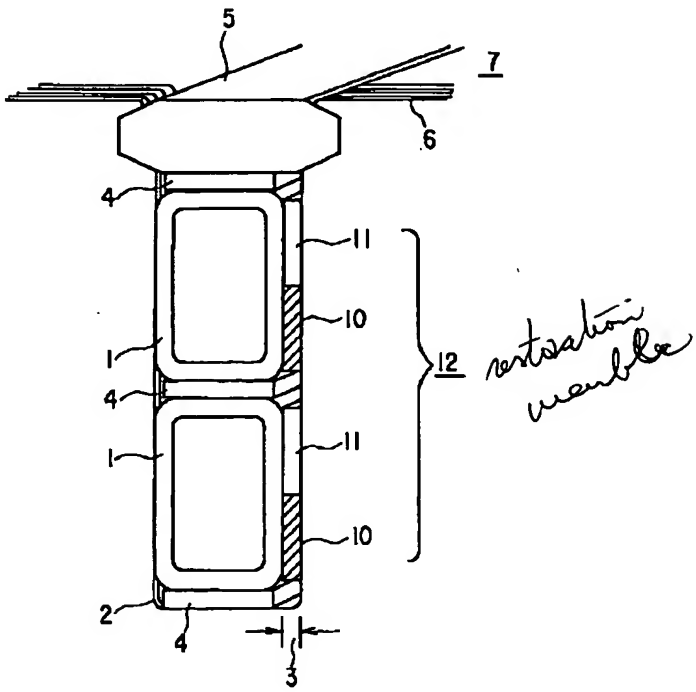


[Drawing 8]

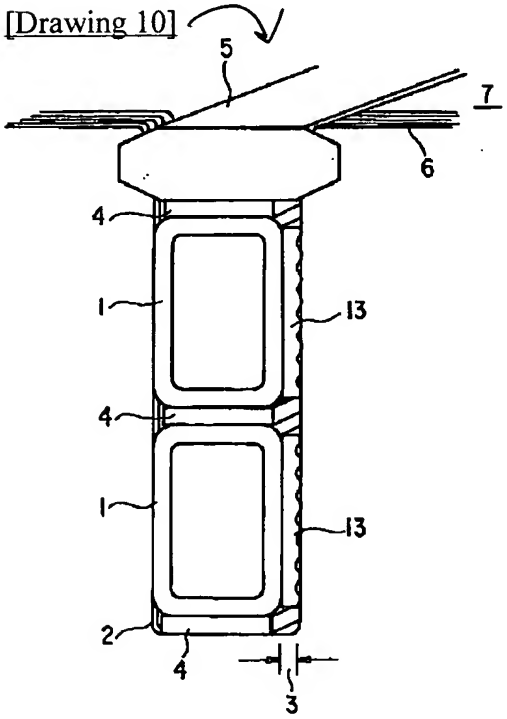


[Drawing 9]

gap



[Drawing 10]



[Translation done.]